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## ANALYSIS OF THE EFFECTIVENESS OF IMPLEMENTATION SAP R/3 IN PT. ABC

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**Abstract:**

This research analyses the effectiveness of SAP R/3 toward user satisfaction in using the application. The research is in PT ABC, manufactured in paper and tissue products. The research questions of this research are: "Is there any gap between the user expectation about the effectiveness of the application and the application's performance? Are some factors, which are integrated data, reliable report, processing time, and flow of information between departments significantly, affecting the user satisfaction in using SAP R/3?" The data for this research is collected using questionnaires to the employees of four departments in PT. ABC, which are the Sales and Marketing Department, Finance and Accounting Department, Production Department, and Logistics Department. The analysis used in the research is Gap Analysis and Multiple Regression Analysis. The results of this research are: "There is a gap between the user expectation about the effectiveness of the application and the application performance. Three factors significantly affect user satisfaction in using SAP R/3: integrated data, reliable report, and processing time." The benefit of the research is the effectiveness of the SAP R/3 implemented in PT. ABC. The research result can be used as a reference for further improvement of SAP R/3. The research results can be used as a reference for other companies or organizations implementing SAP R/3.

**Keywords:** Application Performance, Effectiveness, Gap, User Information Satisfaction, User Satisfaction.

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## INTRODUCTION

PT. ABC is a company that produces paper and tissue products. Information is the most crucial aspect that contributes to most business processes. In running the business process, PT. ABC had some problems because all business process activities were done manually. These manual activities caused problems such as unintegrated data caused by human error and different data in each department. The report has no standard format because each department uses its program application. So, doing their business process will take a lot of time. In order to overcome these problems and support the business process, PT. ABC decided to implement SAP R/3.

**ERP and SAP.** Enterprise Resource Planner (ERP) is a business application designed to provide an integrated, systematic environment for a business to manage its daily activities. "ERP Systems link financial, manufacturing, human resources, distribution, and order management systems into a tightly integrated single system with shared data and visibility across the business" (Escalle & Cotteleer, 2022).

SAP ("Systeme, Anwendungen, und Produkte in Datenverarbeitung" or "Systems, Applications, and Products in Data Processing") was founded by five former IBM employees in 1972 in Germany." (Escalle and Cotteleer, 2022). SAP R/3 (SAP release R/3), available since 1992,

is SAP's application that operates in a client/server architecture and uses a central relational database.

Integration is an essential factor in the most system. "The meant of integration in SAP is that business groups can work with data in a connected system in real-time" (Prince, 2018). Using relational databases and integration in SAP can make SAP valuable, robust and famous in industries. SAP provides a flexible method to establish a business structure because it is designed to reflect any business organization.

According to Phil Robinson (<http://www.vbip.com>), there are some characteristics of SAP R/3, which are: adaptability and scalable, data integrity, Electronic Data Interchange (EDI), self-sufficient, real-time, multi-user, client-server system, and modular. There are three functional areas in SAP R/3: financial, human resources, and logistics (Hernandez, 2015).

**IS Effectiveness Measurement.** The Information System's (IS) effectiveness can be measured through IS usage, user information satisfaction (UIS), quality of decision-making, productivity from a cost/benefit analysis, and system quality (Grover et al., 2016). The IS success model by DeLone and McLean. It consists of six interdependent constructs: System Quality, Information Quality, Use, User Satisfaction, Individual Impact, and Organizational Impact (DeLone & McLean, 2022).

**User Information Satisfaction.** User satisfaction generally results from comparing user expectations of the IS with perceived performance. The gap is the discrepancies between expectations and performance. The perceived performance exceeds the expectation if the gap's value is positive. On the other hand, if the gap's value is negative, the perceived performance is below the expectation. In measuring UIS, some models exist, such as the Miller-Doyle approach, the Kim model, and a gap model (Remenyi et al., 2014).

**The Miller-Doyle Approach.** According to Remenyi et al. (2014), the Miller-Doyle approach is designed to measure the perceived effectiveness of the overall IS function and involves the use of a questionnaire, which consists of five parts labeled Part A through Part E. "Part A consists of 34 questions which measure the extent to which certain facets of the IS are perceived to be important in ensuring the Organization's IS will be effective and successful. The attitudes are rated on a semantic differential scale of 1 (irrelevant) to 7 (very critical). Part B consists of four questions on the future needs for IS; Part C consists of the same 34 questions as Part A, but in this case, the respondent is asked to rate the 34 questions concerning the actual performance achieved within their Organization. Again a 7-point scale is used, but in this case the levels of perceived importance go from 1 (very poor) to 7 (excellent); Part D consists of four questions relating to the Organization's performance in developing new systems; Part E consists of four questions which capture certain demographic data. There is also a question which asks for a rating of the Organization's overall performance on a scale of 1 (complete failure) to 7 (very successful)" (Remenyi et al., 2014).

**The Kim Model.** In the Kim model, UIS is influenced by post-implementation experience and pre-implementation expectations of the IS (Remenyi et al., 2014). This model will be measured the UIS by the discrepancy between the user's perception score of the IS performance and the user's expectation score of the IS. This model will show how discrepancies during the developmental and service delivery processes influence the UIS. The developmental stage consists of two sub-stages: the determination of the IS requirements and the design and installation of the IS (Remenyi et al., 2014).

PT. ABC started to develop SAP R/3 at the end of 2020 and implemented it on June 2021. This research will analyze the effectiveness of implementing SAP R/3 in PT. ABC. The analysis

will be done on user satisfaction with using SAP R/3 to support their job. PT.ABC needs to know whether SAP R/3 gives a significant improvement in order to support the business process. The research questions are:

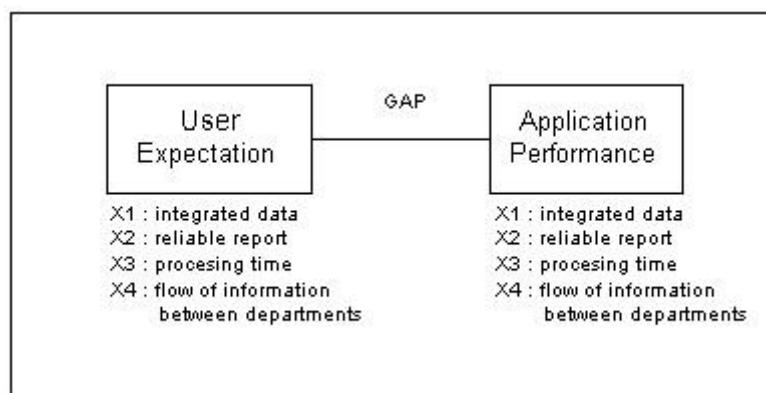
1. Is there any gap between the user expectation about the effectiveness of the application and the application's performance?
2. Is the integrated data significantly affecting user satisfaction in using SAP R/3?
3. Is the reliable report significantly affecting user satisfaction in using SAP R/3?
4. Is the processing time significantly affecting user satisfaction in using SAP R/3?
5. Is the flow of information between departments significantly affecting user satisfaction in using SAP R/3?

## METHODS

**Population and Sample.** The populations of the research are the SAP R/3 users at PT. ABC. Four departments will be chosen as the populations for the research: The sales and Marketing Department, Finance and Accounting Department, Production Department, and Logistic Department. These departments were chosen because the SAP R/3 has been implemented in those departments. The sample will be chosen randomly, not all SAP R/3 users in each department. The method that will be used is the multi-stage random sampling method. This method is chosen because the populations are only some of the company's departments.

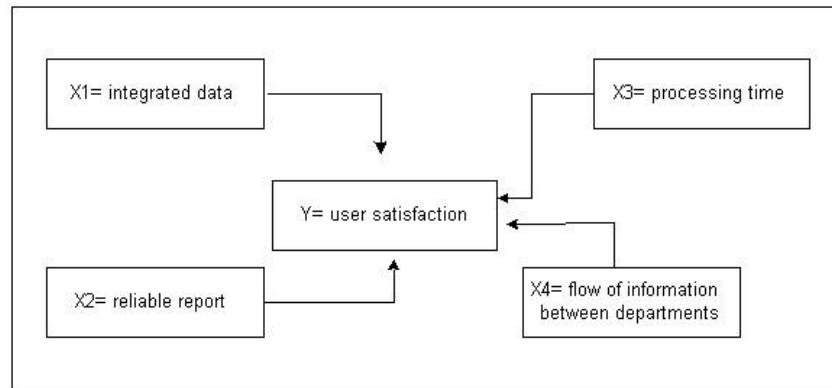
**Time, Location, and Data Collection Method.** The research began on August 2021 in PT. ABC, Manado. The data will be collected through a survey. The questionnaires were used to collect data for the research. The language used in the questionnaire is the Indonesian Language because the respondents are more familiar with Indonesia Language.

**Research Model.** This research will use two research models: the model for the gap analysis (Figure 1) and the model for the regression analysis (Figure 3.2). The gap analysis determines user satisfaction by analyzing the gap between the user's expectations and application performance scores.



**Figure 1.** Research Model for Gap Analysis

The regression analysis is done to determine whether some factors, which are integrated data, reliable reports, processing time, and information flow between departments, affect user satisfaction in using SAP R/3.



**Figure 2.** Research Model for Regression Analysis

**Validity and Reliability.** Data, which are obtained from the research, should be valid and reliable. Validity shows the degree of accuracy, which is the accuracy between actual data and collecting data by the researcher. Reliability shows the degrees of consistency, which is consistency in specific time intervals.

**Statistical Analysis.** This research will use a Paired-sample T-test for the first research model and Multiple Regression Analysis for the second research model.

**Paired-Sample T-Test.** The Paired-sample T-test is done for the difference between the two population means. The test for the difference between the two population means is (Aczel, 2008):

**Multiple Regression Analysis.** Multiple regression analysis is a method of analyzing the change in one variable (dependent variable) by using a set of other known variables (independent variables) in order to estimate the mean value of the dependent variable based on the known values of the other independent variables (Galleries, 2016). The result of regression analysis is the R-squared (R<sup>2</sup>), the multiple coefficients of determination, which describes how well a set of variables explains a dependent variable.

**F-test (Anova test).** F-test (Anova test) is used to test two samples or more. The assumption that used in F-test are (Santoso, S., 2017):

1. The populations are normal distribution
2. The Populations have same variance
3. There is no relation between each sample

The F-value and significance value results will be analyzed. If the significance value is equal to 0.000, it means that the regression as a whole is significant.

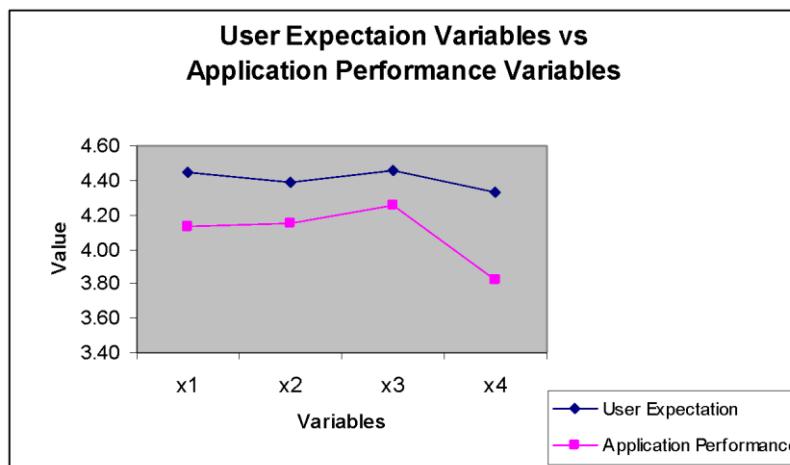
## RESULT AND DISCUSSION

**Survey Result.** The questionnaires were sent to 130 respondents of PT. ABC, Manado. Of 130 respondents, only 123 respondents sent back the questionnaires. Six questionnaires were not fully answered after checking them, so the total number used as the sample was 117.

**Validity and Reliability Analysis.** The validity and reliability of all data must be tested before being used in this research. The validity and reliability test was done by using Cronbach's Alpha Method. SPSS software version 24 was used to test all of the dependent variables (X1, X2, X3, X4) in both parts, which are the User Expectation Part and Application Performance Part, and also the User Satisfaction Part as the independent variable (Y). The validity analysis results show that all variables, which will be used for further analysis, are valid because the value of "Corrected Item - Total

Correlation" is higher than 0.30. The result of the reliability analysis also shows that the instrument is reliable and can be used for further analysis because the Alpha Value is higher than 0.70.

**Gap Analysis.** The result of the Gap Analysis shows that the performance of the application SAP R/3 does not meet the expectation of the user. Figure 4.1 will clearly show the gap between User Expectation and Application Performance.



**Figure 3.** Mean Value of User Expectation Variables vs Application

**Paired Sample Test.** In this research, we will use the z distribution because the quantity of the samples is more than 30. The t values of all the pair variables are less than -1.96. The t value is -5.251, which is less than the z value of -1.96 and the significance level is lower than 0.05. Based on the analysis, we reject the null hypotheses and conclude that there is a significant gap between the user expectation about the effectiveness of the application and the application's performance.

**Table 1.** Paired Sample Test Result

Paired Differences								
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
PX1 - EX1	-0.314	0.616	0.057	-0.201	-0.427	-5.511	116	0.000
PX2 - EX2	-0.239	0.576	0.053	-0.134	-0.345	-4.494	116	0.000
PX3 - EX3	-0.200	0.610	0.056	-0.088	-0.312	-3.548	116	0.001
PX4 - EX4	-0.504	0.732	0.068	-0.370	-0.638	-7.449	116	0.000
PX - EX	-0.314	0.634	0.059	-0.198	-0.430	-5.251	116	0.000

**Table 2.** Analysis of Variance (ANOVA) - First Model

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	11.471	4	2.868	21.757	0.000a
Residual	14.762	112	0.132		

Total	26.232	116	
a Predictors: (Constant), Integrated data, Reliable report, Processing time,			
	Flow of information between the department		
b Dependent Variable: User Satisfaction			

From the result of the ANOVA test or F test shown in Table 4.2, we can see that the significance value is 0.000. This value shows that the regression as a whole is significant.

**Table 3.** Regression Coefficient - First Model

Model	Coefficients		t	Sig.
	Unstandardized Coefficients	Standardized Coefficients		
	B	Std. Error	Beta	
1 (Constant)	0.341	0.481		0.480
Integrated data (X1)	0.189	0.095	0.144	0.049
Reliable report (X2)	0.239	0.099	0.246	0.018
Processing time (X3)	0.356	0.111	0.332	0.002
Flow of information between departments (X4)	0.091	0.057	0.141	0.113

a Dependent Variable: User Satisfaction

Table 3 shows that the significance value of variables X1 (integrated data), X2 (reliable report), and X3 (processing time) are 0.049, 0.018, and 0.002, which are lower than 0.06 (6%). It means that the three variables above are significant. On the other hand, variable X4 (flow of information between departments) has a significance value of 0.113, which is higher than 0.06 (6%). It shows that variable X4 is not significant. So, variable X4 will not be used in the second analysis.

**Regression Analysis - Second Model.** In the Second Model, only three variables are used in the analysis: Integrated data, Reliable reports, and Processing time.

**Table 4.** Analysis of Variance (ANOVA) - Second Model

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	11.134	3	3.711	27.776	0.000a
Residual	15.098	113	0.134		
Total	26.232	116			

a Predictors: (Constant), Integrated data, Reliable report, Processing time

b Dependent Variable: User Satisfaction

The ANOVA or F test result shown in Table 4.4 shows that the significance value is 0.000. This value shows that the regression as a whole is significant.

**Table 5.** Regression Model Summary - Second Model

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df 1	Df2	Sig. F Change	
1	0.651a	0.424	0.409	0.366	0.424	27.776	3	113	0.000	

a Predictors: (Constant), Integrated data, Reliable report, Processing time

b. Dependent Variable: User Satisfaction

The value of R Square from Table 4.5 is 0.424. This means that 42.4% Y (user satisfaction) can be explained by X1 (integrated data), X2 (reliable report), and X3 (processing time). Meanwhile, the rest (100% - 42.4% = 57.6%) explains by other reasons.

**Table 6.** Regression Coefficient - Second Model

Coefficients		Unstandardized Coefficients		Standardized Coefficients		T	Sig.
Model		B	Std. Error	Beta			
1	(Constant)	0.317	0.484			0.654	0.514
	Integrated data (X1)	0.183	0.095	0.140		1.918	0.058
	Reliable report (X2)	0.277	0.097	0.285		2.849	0.005
	Processing time (X3)	0.412	0.106	0.384		3.895	0.000

a Dependent Variable: User Satisfaction

Table 6 shows that the three variables used in the second model have significance values lower than 0.06 (6%), X1 = 0.058, X2 = 0.005, and X3 = 0.000. Thus all three variables are significant.

First, Data Integrity is essential to support the system so it can give all user data. Second, Real-Time means that if data is changed in one department, other users in another department get the same data simultaneously. So, the data process is done at the same the changes occur.

## CONCLUSION

The conclusions that can be drawn based on the gap analysis result, and multiple regression results, are :

1. Based on the first part of the questionnaire, respondents have enough experience using PCs, their educations, and their experiences working in PT. ABC, the result of the research, can be responsible.
2. There is a gap between user expectations and application performance. The gap between user expectation and application performance is in all aspects analyzed in this research: integrated data, reliable reports, processing time, and flow of information between departments. This can be interpreted as an indication that the user is dissatisfied with the application and is not practical.

3. Based on the multiple regression analysis results, three variables significantly affect user satisfaction in using SAP R/3: integrated data, reliable reports, and processing time. Moreover, only one variable, the flow of information between departments, is not significantly affecting user satisfaction with using SAP R/3. It means that the users have high expectations about the three variables but are not concerned about the last variable (flow of information between departments)

**Recommendations.** There are some recommendations, which are :

1. User involvement is essential to be considered in the application development process.
2. Input and opinions from the user can become valuable input in the improvement of the application.
3. The application development team should focus on the three variables that significantly affect user satisfaction: integrated data, reliable reports, and processing time.
4. New users need to be trained before getting a user id and using SAP R/3 so that the application can give optimum benefit for the user or the company.
5. Scheduled training is needed to improve user capability in using SAP R/3 and application development. So, users can use SAP R/3 to give 100% support on their job.
6. Further research needs to be done after some development of R/3.
7. Further research needs to be done to identify other factors that might be affected user satisfaction with using SAP R/3.

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